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09/651,498	08/30/2000	JOHN T. DEVLIN	MIO-0071-PA	1401

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KILLWORTH GOTTMAN HAGAN & SCHAEFF L L P
ONE DAYTON CENTRE
SUITE 500
DAYTON, OH 45402-2023

EXAMINER

KACKAR, RAM N

ART UNIT

PAPER NUMBER

1763

DATE MAILED: 01/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/651,498

Applicant(s)

DEVLIN ET AL.

Examiner

Ram N Kackar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 December 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5,9-12,15-18 and 21-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5,9-12,15-18 and 21-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Cancellation of non-elected claims 6-7, 13-14 and 19-20 and cancellation of claim 8 by way of amendment is acknowledged.

Claim Rejections - 35 USC § 102

- 2 The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

- 3 Claims 1-2, 21-22 and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Banan et al (US 5676751).

Banan et al disclose a heat-regulating frame (Col 2 lines 34-54) having fluid inlet and outlet (Fig 1-33), fluid conduit defining cylindrical void (the volume enclosed by 33), which accommodates an object (3 and the spindle) subject to heat regulation and a circumferential gas flow path (50), a rotary drive motor (7) and a cylindrical rotary spindle (spindle attached to the drive unit 7).

Claim Rejections - 35 USC § 103

- 4 The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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5 Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Banan et al (US 5676751).

In addition to the disclosure in claim 1 and 2 above, Banan et al also disclose a liquid source coupled to the said conduit (35), temperature sensor (39) coupled to objects inside the enclosure including the rotary spindle assembly for temperature measurement and a controller (43) coupled to the temperature sensor and being responsive to the temperature signal (Col 3 line 44- 54).

Banan et al disclose the control unit controlling the heater supply but do not expressly disclose controlling the cooling fluid.

How ever, it would have been obvious for one of ordinary skill in the art at the time invention was made to connect the fluid flow controls to the controller so as to expand the range of temperature control.

6 Claims 9-10 and 32 are rejected under 35 U.S.C. 103(a) as unpatentable over Yoshio Kimura (US 5578127).

Yoshio Kimura discloses a heat-regulating flange (Fig 2-31b) having an upper surface, a lower surface in contact with a rotary drive motor (31), with fluid inlet, fluid outlet (35), a liquid source coupled to fluid duct (33), a passage extending from upper surface to lower surface (31a), temperature sensor in thermal communication with flange and a temperature controller (36) responsive to temperature signal.

7 Claims 1-5, 11-12, 15-18, 21-22, 25-28, 30 and 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugimoto et al (US 5762709) in view of Yoshio Kimura (US 5578127).

Sugimoto et al disclose a spin coating apparatus disclosing a heat regulating element (Fig 2-50), a cylindrical heat regulation void to accommodate an object (Fig 2 1a) and a circumferential gas flow path (Fig 2-30), a temperature sensor in gas flow path (Fig 3 -58a), rotary drive motor, rotary drive spindle (Fig 2-1b, 1) exhaust gas profile (Fig 5 F) and a wafer support (Fig 2 W).

Sugimoto et al do not disclose the regulating frame with fluid inlet and outlet and an additional heat-regulating flange attached to the drive motor.

Yoshio Kimura discloses a heat regulating flange (Fig 2-31b), a rotary drive motor (31) attached to a rotary spindle extending through flange body (31a), liquid source coupled to the fluid conduit (33), a controller coupled to the liquid source (fig 2-36 and Col 5 line 17-19 and line 42- 50), programmed (Col 5 line 42-50) to be responsive to a signal from a temperature sensor proximate the rotary spindle passage and fluid conduit (Arrow connected to 36) so as to control temperature of flange by controlling the temperature of the fluid (Col 4 line 47-50) and a rotatable wafer support (28).

Therefore it would have been obvious for one of ordinary skill in the art at the time invention was made to replace external air flow temperature adjustment unit of Sugimoto by a water jacket around the gas flow enclosure (30) like the one Yoshio Kimura discloses around the rotary spindle in order to have more efficient and less expensive temperature control system and additionally to have a heat regulation flange (as disclosed in Fig 2) to prevent heat conduction from the motor to the wafer.

Regarding claim 26, Sugimoto et al do not expressly disclose a ring type support for the cylindrical heat-regulating element. But it would be obvious that the mechanical support to hold

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the heat-regulating element would inherently be a ring shaped to allow the spindle to pass through.

8 Claims 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugimoto et al (US 5762709) in view of Yoshio Kimura (US 5578127) as applied to claim 1 and further in view of Stone (US 4250717).

Sugimoto as modified by Yoshio Kimura discloses fluid conduit like in a water jacket with inlet and outlet but do not disclose length of tubing.

Stone discloses wrapping tubes around a cylindrical object for temperature control (Abstract and the figure).

It would therefore be obvious for one having ordinary skill in the art at the time when invention was made to use length of wound tubing instead of a jacket for its economy and ease of fabrication.

9 Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sugimoto et al (US 5762709) in view of Yoshio Kimura (US 5578127) as applied to claim 3 and further in view of Takahashi et al (US 5259735).

Yoshio Kimura discloses a mode of cooling by keeping the flow rate constant and controlling the temperature (Col 4 line 55-58).

However, temperature could also be controlled by varying the flow rate as disclosed by Takahashi (Col 3 line 31-33).

It would therefore be obvious for one having ordinary skill in the art at the time when invention was made to accomplish temperature control by varying the flow of water because of its simplicity.

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10 Claims 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshio Kimura (US 5578127) in view of Hayes (US 6107608).

Yoshio Kimura discloses temperature control (Fig 2) but does not expressly disclose the location of the temperature sensor.

Hayes discloses a similar heat-regulating flange where the temperature sensor is embedded in it (Fig 7-38 and Col 5 line 47-48).

It would therefore be obvious for one having ordinary skill in the art at the time when invention was made to embed the temperature sensor so as to have a more stable feed back control of temperature at the spin chuck, being closer to the flange.

Response to Amendment

1. Applicant's arguments filed 12/06/2002 have been fully considered but they are not persuasive. Applicants arguments and Examiners response follow:

Applicant: Banan fails to teach a fluid conduit defining a substantially cylindrical heat regulation void to accommodate an object subject to heat regulation

Examiner: The jacket provides a channel (conduit) where water enters and exits and encloses (cylindrical) a void where an object (crucible) subject to heat regulation resides and gas flow path exists between rotary spindle and fluid conduit.

Applicant: Kimura does not show a passage extending through flange from an upper surface to a lower surface.

Examiner: Kimura does show a passage extending through the flange where the spindle 31a passes through the flange (Fig 2) and (Fig 2-20).

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Applicant: Kimura does not show or teach a temperature sensor positioned in thermal communication with a flange body proximate to the passage.

Examiner: Kimura shows a logical connection to the flange and to fluid recirculator. The logical connection to flange could be only an input from the flange, which would inherently be a temperature signal. Kimura clearly says that the objective is to control the temperature of the flange to a certain value (Col 5 lines 25-29). Having a temperature sensor at the recirculator will not be able to control temperature at flange or spin chuck because of temperature gradient.

Applicant: Replacing the air conduit 30 of Sugimoto with a water jacket would destroy the operability of the spin coating system because underside of the substrate would be subject to undesirable contamination.

Examiner: Firstly, examiner did not suggest replacing air conduit 30 with a water jacket. Examiner only suggested a water jacket like disclosed by Kimura around gas flow enclosure 30. Secondly, the removal of mist and particles is handled by exhaust zone 10 and exhaust vent 11. Using a water jacket would not change this. It would only simplify temperature control.

Applicant: There is no motivation to combine the temperature sensor of Hayes with the flange of Kimura and the heat exchanger may rotate or be movable.

Examiner: Firstly the examiner has not relied upon the embodiment where the heat exchanger rotated. Secondly the motivation to combine the two references

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comes from their teachings. It is not necessary that they should be completely mechanically compatible to each other.

Conclusion

2. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ram N Kackar whose telephone number is 703 305 3996. The examiner can normally be reached on M-F 8:00 A.M to 5:P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on 703 308 1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872 9310 for regular communications and 703 872 9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0661.

RK

January 4, 2003


GREGORY MILLS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1100